

1914

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RS
PiInsect Control,
Investigations.PRIMARY AND SECONDARY SPECIESKILLING YELLOW AND SUGAR PINE.

The data herein tabulated was collected on ^{from} the treated trees on the several Insect Control Projects in District 5. A total of 3,762 yellow pines, 136 sugar pines and 79 Jeffrey pines are considered. This data is principally valuable as showing the percentage of trees killed by each species of insect, thereby determining the most injurious insects to each tree species, both locally and throughout the various forests; the species of insects which will breed on all three pines, although not always primary; and the secondary species bred by each tree which may either be primary in killing one species of pine, or parts of trees, as for instance the tops and limbs.

We have here absolute records of *Dendroctonus brevicomis*, *D. monticolae*, *D. valens*, *Melanophila gentilis*, *Ips confusus* and the pitch moth (*Vespa mima sequoiae*) killing yellow pines (*Pinus ponderosa*), although the pitch moth and the Red Turpentine Beetle (*D. valens*) are decidedly in the minority. In the sugar pine (*Pinus lambertiana*) the Mountain Pine Beetle (*Dendroctonus monticolae*) seems to be the only one of any im-

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portance, although here also *D. valens* kills an occasional tree. In the Jeffrey pines we find three important killers, *Dendroctonus jeffreyi*, *Melanophila gentilis* and *Ips emarginatus*.

The importance of secondary species on individual trees becomes here apparent and justifies the contention that a method of control which kills only the primary insect and leaves the secondary insects, on that particular tree, to breed, is faulty. For instance, *Ips emarginatus*, secondary on yellow and sugar pine, is a primary agent of considerable importance on Jeffrey pine, killing ^{12.7%} ~~19%~~ of 79 trees. Also that secondary species such as *Dendroctonus valens*, *Ips emarginatus* and *Melanophila gentilis* are common to all three pine species and are often primary on one or all three. *Ips confusus* nearly always secondary on two species, becomes primary on one tree species and in two projects killed approximately 50% of all trees under 12 inches D. B. H.

The most careful work in regard to secondary insects was done on the Trinity by Forest Examiner O. M. Evans. *Dendroctonus brevicornis*, *D. monticolae*, *D. valens*, *Melanophila gentilis*, *Ips confusus*, *Ips emarginatus* and a *Hylurgops* sp. are here enumerated as secondary on yellow pine in combinations of two, three or four species on all trees. Except the last, these are all primary on the host (yellow pine) or some other pine in the same area. In the same way the secondary species on sugar pine are the same, with the exception of *Dendroctonus brevicornis*, which

seems to be confined to yellow pine.

With this evidence before us it can readily be seen that control of the part of the tree attacked by the primary agent is an incomplete control, even if the factor of wholly secondary insects, which damage limbs, roots, etc., is not taken into consideration.

California

(Goodyear Project).

1914.

Yellow Pine:

Dendroctonus brevicomis	-----	89	Trees.
" " and monticolae	-----	4	"
" monticolae	-----	3	"
Ips confusus	-----	1	"
		<u>97</u>	Trees.

Sugar Pine:

Dendroctonus monticolae	-----	33	Trees.
Ips confusus	-----	0	"
		<u>33</u>	Trees.

Stanislaus

(Bullock Project).

1914.

Yellow Pine:

Dendroctonus brevicomis	-----	428	Trees
" " and Ips confusus	-----	1	"
" monticolae	-----	7	"
Ips confusus	-----	489	"
Melanophila gentilis	-----	5	"
		<u>930</u>	Trees.

Sierra

(Blue Canyon Project).

1914.

Yellow Pine:

Dendroctonus brevicomis -----	126	Trees.
" " and D. valens -----	10	"
" " " Ips confusus -----	71	"
" " Ips confusus & D. valens ---	16	"
Ips confusus -----	63	"
Mistletoe -----	1	

287 Trees.

Sierra

(Mariposa Project).

1914.

Yellow Pine:

12 in. and under, D.B.H. ----		
Dendroctonus brevicomis -----	298	Trees.
Ips confusus -----	288	"
14 to 20 in. inclusive, D.B.H. -		
Dendroctonus brevicomis -----	210	"
Ips confusus -----	68	"
Dendroctonus monticolae -----	1	

Over 20 in., D.B.H. -		
Dendroctonus brevicomis -----	102	"
Ips confusus -----	16	

983 Trees.

Sierra

(Stephenson Creek Project).

1914.

Yellow Pines, 276 Trees.

From the evidence on the Insect Control Sheets
(Form I) the spotter (R. S. A.) is unable to
distinguish the different species.

Sierra

(Jose Basin Project).

1914.

Yellow Pines:

Dendroctonus brevicomis	-----	129	Trees.
" " and Ips confusus	-----	10	"
" valens	-----	1	"
Ips confusus (all below 20" D.B.H.)	-----	49	"
		<u>189</u>	Trees.

Sierra

(Chiquito Project).

1914.

Yellow Pines:

Dendroctonus brevicomis	-----	249	Trees.
" " and D. valens	-----	6	"
" " " Ips confusus	-----	9	"
" " " D. monticolae	-----	1	"
" " " Ips emarginatus	-----	3	"
Ips confusus	-----	9	"
Melanophila gentilis	-----	15	"
		<u>292</u>	Trees.

Jeffrey Pines:

Dendroctonus jeffreyi	-----	15	Trees.
" " and Melanophila gentilis	--	2	"
" " " D. valens	-----	1	"
" " " Ips emarginatus	-----	32	"
" " Mel. gentilis & I. emarginatus		3	"
" " Mel. gentilis, D. valens & Ips	"	1	"
Melanophila gentilis	-----	11	"
" " and D. valens	-----	1	"
" " " Ips emarginatus	-----	3	"
Ips emarginatus	-----	10	"
		<u>79</u>	Trees.

Sugar Pines:

Dendroctonus monticolae	-----	28	Trees.
" " and D. valens	-----	15	"
Mistletoe	-----	1	"
		<u>44</u>	Trees.

Trinity

(Hayfork Project).

1914.

Yellow Pines:

Dendroctonus brevicomis	-----	131	Trees.
"	" & Melanophila gentilis	88	"
"	" D. valens	97	"
"	" Ips confusus	46	"
"	" " emarginatus	1	"
"	" D. monticolae	1	"
"	Mel.gentilis & D. valens	44	"
"	" " " D. monticolae	4	"
"	" " " Ips confusus	7	"
"	Ips confusus & D. valens	23	"
"	" emarginatus & D.valens	3	"
"	" " & Ips confusus	2	"
"	D.monticolae & D. valens	3	"
"	" " " Ips confusus	2	"
"	M.gentilis,D.monticolae & D. valens	4	"
"	" " " " & I.confusus	4	"
"	" " "valens & " "	11	"
"	" " " " "emarg.	1	"
"	Ips confusus & Ips emargin.	1	"
"	D.monticolae,D.valens & Ips. confusus	2	"
"	D.valens,Ips confusus & Ips emarginatus	1	"
"	M.gentilis,D.monticolae,D. valens & Ips. confusus	4	"
"	M.gentilis,D.monticolae,D. valens & Hylurgops,sp.	1	"
"	monticolae	3	"
"	" & D. valens	2	"
"	" & Ips confusus	1	"
"	" & Melanophila gentilis	4	"
"	" M.gentilis & D. valens	2	"
"	" Ips confusus & D. valens	2	"
"	valens	1	"
Melanophila gentilis	-----	387	"
"	" & D. valens	39	"
"	" & Ips confusus	16	"
"	" & " emarginatus	1	"
"	" Ips confusus & D. valens	7	"
"	" " & Ips emarginatus	1	"
"	D.brevicomis,D.monticolae, D.valens & Ips confusus	1	"

Trinity

(Hayfork Project) Cont.

1914.

Ips confusus -----	34	Trees.
" " & Dendroctonus valens -----	7	"
" " D. valens & Ips emarginatus -----	1	"
" " & Ips emarginatus -----	3	"
Vespa mima sequoiae (Pitch moth) -----	1	"

984 Trees.

Trinity

(Hayfork Project).

1914.

Sugar Pines:

Dendroctonus monticolae -----	34	Trees.
" " & D. valens -----	12	"
" " & Ips confusus -----	3	"
" " M. gentilis & Ips confusus -	2	"
" " " " & D. valens ----	4	"
" " Ips confusus & D. valens ---	1	"
" " Ips confusus, Ips emarginatus		
& D. valens -----	1	"
" " & Hylurgops, sp. -----	1	"
" valens -----	1	

59 Trees.

Note: One tree (#898) with a diameter of 44" was noted which had been primarily attacked by *Melanophila gentilis*, followed up by *Dendroctonus brevicomis* and other species.

It will be noticed that in yellow pines *Dendroctonus brevicomis* and *Ips confusus* occur as primary in killing the trees on all projects, both in the Coast Ranges and in the Sierras. *Dendroctonus monticolae* is seldom primary in clear yellow pine stands as for instance Jose Basin, but is primary wherever there are infested sugar pines. That occasional trees are killed by *Dendroctonus valens* and that *Melanophila gentilis* locally is one of the most important killers. Taking District 5 as a whole,

the species rank numerically as in the following table:

Dendroctonus brevicomis	----	1
Ips confusus	-----	2
Melanophila gentilis	-----	3
Dendroctonus monticolae	----	4
" valens	-----	5

Ips emarginatus, while breeding on both yellow and sugar pines, seldom becomes primary except in Jeffrey pines where it is primary in almost 13% of the trees. *Ips confusus* does not seem to attack Jeffrey pines and so far we have not any record of it killing this species of tree. *Melanophila gentilis*, however, kills both sugar, yellow and Jeffrey pines and as a killer of mature timber of all species probably ranks next to the three primary *Dendroctonus* species; *D. brevicomis*, *monticolae* and *jeffreyi*.

Of the 136 sugar pines 134 were killed by *Dendroctonus monticolae*, so that from a sugar pine standpoint this is the only species we need consider, but the fact must not be lost sight of that secondary bark borers on the sugar pine are primary on both yellow and Jeffrey pines. The following summary for the season of 1914 gives the number of trees considered in this report by projects and the number of trees killed by each species of beetles with the percentages for each:

Summary (1914)

Yellow Pines:

Trinity (Hayfork Project) ----- 984 Trees.

Summary (1914) (Cont.)

Yellow Pines:

Amount brought forward -----	984	Trees.
California (Goodyear Project) -----	97	"
Stanislaus (Bullock ") -----	930	"
Sierra (Chiquito Project) -----	292	"
" (Blue Canyon ") -----	287	"
" (Mariposa ") -----	983	"
" (Jose Basin ") -----	189	"

3762 Trees.

Jeffrey Pines:

Sierra (Chiquito Project) -----	79	Trees.
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Sugar Pines:

Trinity (Hayfork Project) -----	59	Trees.
California (Goodyear Project) -----	33	"
Sierra (Chiquito Project) -----	44	"

136 Trees.

Yellow Pines:

Dendroctonus brevicomis -----	2244	Trees.
" monticola -----	25	"
" valens -----	2	"
Melanophila gentilis -----	461	"
Ips confusus -----	1028	"
Vespamina sequoiae -----	1	"
Mistletoe -----	1	"

3762 Trees.

Jeffrey Pines:

Dendroctonus jeffreyi -----	54	Trees.
Melanophila gentilis -----	15	"
Ips emarginatus -----	10	"

79 Trees.

Sugar Pines:

Dendroctonus monticola -----	134	Trees.
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Summary (1914) (Cont.)

Sugar Pines:

Amount brought forward -----	134	Trees.
Dendroctonus valens -----	1	"
Mistletoe -----	1	"
	<u>136</u>	Trees.

Yellow Pines:

Dendroctonus brevicornis -----	59.6%
" monticolae -----	.7
" valens, etc. -----	.1
Melanophila gentilis -----	12.2
Ips confusus -----	27.4

Jeffrey Pines:

Dendroctonus jeffreyi -----	68.3%
Melanophila gentilis -----	19.
Ips emarginatus -----	12.7

Sugar Pines:

Dendroctonus monticolae -----	98.5%
" valens & mistletoe -----	1.5

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